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Holt, Erastus Eugene

Physical economics

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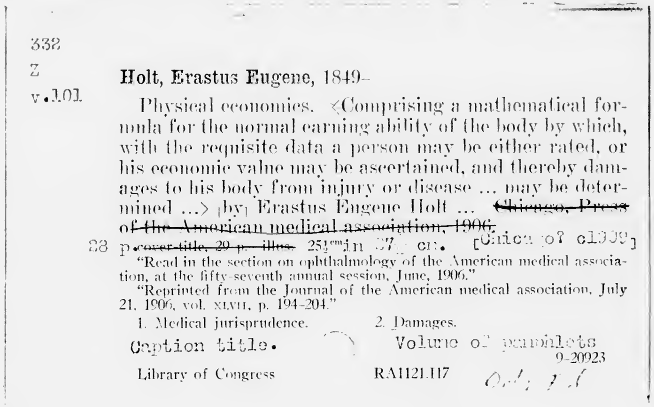

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Holt, Erastus Eugene, 1849-

Physical economies. <Comprising a mathematical formula for the normal earning ability of the body by which, with the requisite data a person may be either rated, or his economic value may be ascertained, and thereby damages to his body from injury or disease ... may be determined ...> [by] Erastus Eugene Holt ... ~~Chicago, Press of the American medical association, 1906.~~

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PHYSICAL ECONOMICS,

COMPRISING A MATHEMATICAL FORMULA FOR DETERMINING THE EARNING ABILITY OF A PERSON WHICH MAY BE USED EITHER TO RATE HIM, OR TO OBTAIN HIS ECONOMIC VALUE, AND TO ASCERTAIN DAMAGES TO ANY PART OR PARTS OF HIS BODY FROM INJURY OR DISEASE IN A MANNER EQUITABLE TO ALL CONCERNED.

ERASTUS EUGENE HOLT, A.M., M.D., LL.D.,
Portland, Maine.

The mathematical formula for the normal earning ability of the body has been specially devised for determining the earning ability of a person in accordance with all the existing conditions of its indispensable elements, defined by an analysis as the functional, the technical, and the competing ability. When these elements are used as factors in the formula, and the problem is solved according to the principles upon which it is constructed, the resulting value is the earning ability. This may be used either to rate that person, or to obtain his economic value. With his economic value his economic loss from damages to any part, or parts, of his body from injury or disease may be ascertained in a manner equitable to all concerned. In this analysis of a person it is evident that the structures and functions of the body are absolutely indispensable to the earning ability of that person. These, therefore, are of first importance, and may be designated the functional ability of the body, and represented by F, the first letter of the first word, as a symbol to be used in the formula.

The next most important element of a person's earning ability is his education, in its broadest sense. He must have training of the mind and body to prepare himself to perform the duties of some occupation if he is to have an earning ability of economic value. The second element of the earning ability of a person may be designated the technical ability, and represented by T, the first letter of the first word, as a symbol to be used in the formula.

The third and last element of the earning ability of a person is his ability to secure work and accomplish what is required of him, or to secure an occupation and perform the duties of it successfully. He must obtain some kind of work and serve an employer successfully in order to have an earning ability of economic value. This third and last indispensable element of the earning ability may be designated the competing ability, and be represented by C, the first letter of the first word, as a symbol to be used in the formula.

We have thus analyzed a person and determined that there are three indispensable elements to his earning ability, represented by the three symbols, F, T, and C.

We will let E be a symbol to represent the earning ability, and now, expressing these three factors as equal to E, we have $F\,T\,C = E$, the mathematical formula for the normal earning ability of the body.

It is evident that these three elements of a person fulfil all the requirements of his earning ability, and that they must be used as factors to meet every existing condition of the elements of that earning ability. They are not of equal value in the earning ability, although the efficiency of each one is interdependent upon the other, F being the most important; T second in importance; while C is least important, because it depends on the efficiency of the other two factors and the demands of employers. C not only depends upon F and T for its efficiency, but the elements of which it is composed are the same as F, and therefore when F is damaged from injury or disease, C is also damaged, either to the same extent or to a greater or less degree, according to the functions of the part or parts involved in the vocation of the person.

In order to determine the condition of F in any given case of

damage to the body we must examine the different systems and organs of which it is composed and compare and test them with standards of measurement. The difference between what we find the functions of any given system or organ to be and the standard of measurement is a fraction of that system or organ which, subtracted from it regarded as unity, gives a remaining fraction which represents the remaining functions of the system or organ examined. In order to obtain these values of F upon the same principles upon which E is determined we must analyze the structures and functions of the body and see how they may be grouped into units according to their development and associated functions, and used as factors in a mathematical formula for obtaining the existing functional ability of the body. In this analysis we again use the same method employed in the natural sciences to obtain the value of any physical force, because this method will give the values of the structures and functions of the different systems and organs, which will always agree with all their existing conditions. Therefore, this method, as here applied, not only gives results which are scientifically correct, but which agree in every particular with the actual existing conditions of the elements of E. In the analysis of F for the purpose of determining the elements which may be used as factors in a mathematical formula for obtaining its value by a method based upon the same principles as that by which E is obtained, F is resolved into its component parts by first selecting and grouping all the systems and organs of the body into four units; and, second, dividing each unit into three parts by selecting such systems and organs as may be used as factors of the unit. We thus have three parts of each unit as factors of the unit and four units as factors of F, making twelve factors of the four units, each one of which bears the same relation to its unit as each unit does to F. We are thus able to determine the structural and functional conditions of each system and organ of the body separately and together as they carry on their functions in the body.

As much as possible systems and organs have been selected and grouped together as units in accordance with their development and associated functions in the body, it having been found sufficient for all practical purposes to have four divisions of F as units, and to have three divisions in each unit as factors of the unit which when designated by the first letters of the alphabet are as follows:

F=
- a= Osseous, articular, and muscular systems, consisting of: ……………………
  - e, the bones,
  - f, the joints,
  - g, the muscles.
- b= Circulatory and respiratory systems, consisting of: …..
  - h, the vascular system,
  - i, the blood,
  - j, the lungs and their accessory organs.
- c= Digestive and genito-urinary systems, consisting of: …..
  - k, the alimentary canal and its accessory organs,
  - l, the skin,
  - m, the kidneys with the genital organs.
- d= Cerebro-spinal system, nerves, and organs of special sense, consisting of: ………….
  - n, the brain, its membranes, and its nerves,
  - o, the spinal cord, its membranes, and its nerves,
  - p, nerves and organs of special sense.

This analysis of F shows its composite nature, and it also shows that each division of a unit must be regarded as a factor of the unit and the units as factors of F, in order to meet and fulfil every condition of the systems and organs of the units that may exist in health, or take place in damages to the body from injury or disease.

This may be illustrated very readily in unit d, if from injury or disease we suppose that a person becomes permanently blind and deaf. It must be admitted, without argument, that a person who has become permanently blind and deaf has no functional ability and, if so, no earning ability. This is exactly the value obtained by considering unit d equal to the product of its three factors, namely, n o p = d, for, if in examining unit d of a person we found the functions of sight and hearing gone, we would give the remaining functions of the factor p as equal to O, and in any computation, if one of the factors becomes O the product is O also; hence, d becomes O, and if d becomes O, F also becomes O. If F becomes O, then E becomes O. It will be seen then that, by considering the divisions of a unit as factors of the unit and multiplying them, we arrive at values which correspond exactly to the existing conditions of the factors of a unit, and by considering the units as factors of F we arrive at a value of F which corresponds exactly to the existing conditions of the units, and, finally, by considering F, T, and C as factors of E we arrive at values which correspond exactly to the existing condition of the elements of E. Thus, all these values are obtained by one uniform method which corresponds in every particular to that which is employed in the natural sciences to obtain the value of any physical force. The only other way to obtain values from similar conditions is by addition and subtraction. This leads to an absurdity, as may be seen from the case just cited; for, if the other two divisions of the unit d were normal, which is a conceivable condition of a person (he might be blind and deaf and the other two parts of the unit d, n, the brain, and o, the spinal cord, might be normal), and we arrived at the value of the unit d by addition and subtraction, we would have two-thirds of it left; and if the other three units of F were normal, which is also conceivable, we would have eleven-twelfths of F left, which would be an absurdity when that person was permanently blind and deaf. Those who are still inclined to cling to empirical methods reply that no one would think of attempting to determine the functional ability of a person permanently blind and deaf. That would be true in such a manifest total disability, but if these empirical methods are employed to obtain the loss from damages to the body of lesser degrees, the results thus obtained are just as liable to be proportionately as far from the actual disability of that person as that obtained by these methods in the case cited of the person permanently blind and deaf. In other words, when damages to the body are obtained by empirical methods, the results are uncertain: they may or they may not agree with the actual existing conditions, whereas scientific methods which agree with the actual conditions of the body in health will also agree with the actual existing conditions of the body when standards of measurement have been agreed upon and are used to obtain the remaining functions of the systems and organs of the body in accordance with the principles upon which the formula is constructed.

In this analysis of F we have changed its coefficient of unity into (a b c d), and as C depends upon the same elements for its existence as that of which F is composed, its coefficient becomes (a b c d), and thus expressed in the formula for the normal earning ability of the body we have:

$$(a\ b\ c\ d)\ F\ T\ (a\ b\ c\ d)\ C = E.$$

T is gained during the growth of the body, and is largely dependent upon the condition of F, as may be observed in persons with partial loss of sight or hearing. As T is so largely dependent upon F, the latter should be taken into consideration in ranking at school. We might mention, parenthetically, that this is being done at the University of Maine, where F and T are considered factors of the efficiency of a student. The gain in the efficiency between the beginning and the end of the first four years, by this method which ended in 1908, showed that it was those students who made the greatest effort to improve their physical and mental conditions that had the greatest percentage of gain and therefore won the prizes.

As important as T is to the person in ranking him and in his earning ability, when that person's vocation becomes fixed, T becomes fixed also and equal to one in establishing damages. The technical ability is not injured, but limited only in proportion to the damage to F, whose impairment includes these damages; therefore, T may be discarded and the formula, modified

for determining damages to the body from injury or disease, becomes:

$$(a\ b\ c\ d)\ F\ (a\ b\ c\ d)\ C = E.$$

In determining damages to any system or organ of the body, the physician must first examine the system or organ and compare the condition in which he finds it with standards of measurement for such system or organ. By this comparison he determines the amount of the loss to the system or organ in any given case. If he assumes that the system or organ was in a normal condition before this particular damage occurred, then the difference between what he finds and the standard of measurement represents a fractional loss of that system or organ. This fractional loss, subtracted from the system or organ regarded as unity, gives the remaining value of that system or organ. When the injury to the body occurs in different parts of a system or organ included in either one of the three divisions of a unit, namely, in either one of the factors of a unit, the damage to the several parts may be added together for the purpose of obtaining the total amount of damages to that factor of the unit, and this amount subtracted from the factor of the unit regarded as one gives the remaining value of that factor. When an injury occurs to any other factor of that unit the total damage to that factor and its remaining value may be obtained in the same manner. If these are the only two factors of a unit damaged, their remaining values are to be multiplied together for the remaining value of the unit. If all three factors of a unit are damaged, their remaining values are to be multiplied together for the remaining value of the unit. If either of the other three units of the body have been injured, their remaining value is to be obtained in a similar manner. If only one unit of the body has been injured, the remaining value of that unit is the remaining value of F. If two or more units of the body have been injured, then the remaining value of these damaged units are to be multiplied together for the remaining value of the units, and this remaining value will be the remaining value of F.

The methods here set forth apply alike to all the systems and organs of the body. They are based upon scientific principles, and when used with standards of measurement obtained upon the same basis will determine the damage of F of all classes corresponding to the loss in each individual case.

We will now illustrate their application first to damages to the eyes alone, and then in connection with damages to other parts of the body occurring at the same time.

Assuming that both eyes were normal previous to an injury that caused sudden loss of sight of one eye, the eye itself being retained and presenting nothing abnormal in appearance, what is the damage to the person's earning ability? The loss is in the field of vision and in the functions of binocular vision. It diminishes a person's ability to guard himself against an injury which may come in the region of the lost field of vision, and it also subjects him to accidents from his inability to estimate distances correctly. This loss affects a person more at first than after he has become accustomed to it, and more in some occupations than in others; nevertheless, the loss is a constant one and liable to lead to serious accidents. On the law of averages this liability to further accidents and loss of functions must be taken into consideration in determining the loss of sight of one eye. We must also consider the cause of the loss of sight of one eye and its effect in the near future, or remotely upon the functions of the other eye. The actual loss in the field of vision when the sight of one eye is lost may be ascertained by considering the two fields to extend from a common center 90 degrees each way, half of a circle, or 180 degrees. Each eye has a field of 90 degrees to the temporal side and 60 degrees to the nasal side of its own, thus leaving 30 degrees on the temporal side belonging to each eye alone. Therefore, when the sight of one eye is gone the loss in the field of vision of the two eyes together is 30 degrees belonging to the eye alone

whose sight has been lost. This is one-sixth of the field of vision of both eyes together, therefore five-sixths of the field of vision is left. This loss in the temporal field of vision of 30 degrees is not so serious to a person as the loss of 120 degrees of the field of vision which is in common with the other eye, as the latter is more important in estimating distances, etc., as anyone may ascertain by a little experiment. Taking into consideration the loss in the temporal field, which leaves a person unguarded against injuries from that direction, and the loss in the person's ability to estimate distances and avoid accidents from that source, the loss may be determined to be 0.16 in factor p, and therefore 0.84 of that factor remains. No other factor of the unit d being injured, this is the remaining value of unit d, and no other unit of the body being injured, it is the remaining value of F also. Introducing this value into the formula as the coefficient of F and C, we have $0.84 F\ 0.84 C = E$.

We must now determine the status of C of a person with the loss of the sight of one eye with the external appearance as good as the other eye, which is normal. It is evident that it would be but slightly affected either in his ability to execute or in the estimation of an employer to perform his duties. He would not be selected to perform the duties in any public conveyance, neither would he be selected to perform the duties of a mechanic around machinery, other things being equal in another man with two good eyes who was available. Taking all these conditions into consideration, on the law of average we will select for the exponent of $C^{\frac{1}{10}}$, and we have (1) $0.84 F\ 0.84^{\frac{1}{10}} C = E$. Hence $E = 0.8257$, and the loss in E is 0.1743, or \$174.30 on each \$1,000 of the economic value of the person. If the person were twenty-five years of age and earning \$1 per day, or \$300 per year, his economic value would be according to the evom table \$6114.51, equal to 6.11451 thousands, and multiplying the loss on \$1,000, namely, \$174.30 by 6.11451, we have \$1,065.75, the economic loss for the loss of the sight of one eye of a person earning \$1 per day at the age of twenty-five whose economic value is determined on the basis of $1 a day or $300 a year, at a 3½ per cent. discount.

If the same person met with an accident and the eye had to be removed, the loss in the functional ability of the eyes would be the same, but C would be more seriously affected, for, however well an artificial eye might match the good eye, it would be difficult to conceal the fact that the eye had been removed. Therefore, C would be damaged more by the removal of an eye than by the loss of the sight of an eye in any vocation. If we deterimne that C is damaged as much as F, in a certain vocation when an eye has been removed, we would have (2) 0.84 F 0.84 C = E. Hence E = 0.7056, and the economic loss would be 0.2944, or $294.40 on each $1,000 of the person's economic value. Multiplying $294.40 by 6.11451, we have $1,800.11, which is $734.36 more than when the sight of an eye was lost as obtained by 0.84 C being considered damaged 6 degrees less than 0.84 F. If the vision in one eye was 0.4 scientific standard of measurement, and the good eye should be lost by accident, then the damage to C would be more serious than to F, and consequently C would be diminished in value to a greater degree, because the person would not be able to do so much or so good work as before. To diminish C in accordance with the principles upon which the formula is constructed, we must multiply it by itself in order to have the remaining value of E correspond to the damage to C. If it were determined that C was damaged to the first degree more than F, then we would have (3) $0.84\ F\ 0.84^2\ C = E$. Hence E = 0.5927, and the economic loss would be 0.4073, or $407.30 on each $1,000 of the economic value of the person. Multiplying $407.30 by 6.11451, we have $2,490.43, which is $690.32 more than when C is damaged to the same degree as F. We thus have to consider three conditions of C, namely, when it is damaged to the same degree as F, and when it is damaged to a greater or a less degree than F.

The treatment of these conditions may be stated as follows:

(1) When C is damaged to the same degree as F, their coefficients are to be multiplied together to obtain the value of E.

(2) When C is damaged to a degree greater than F, the coefficient of C must be diminished in value before it is multiplied by the coefficient of F, in order to have E diminished to correspond with the greater amount of damage to C.

(3) When C is damaged to a less degree than F, the coefficient of C must be increased in value before it is multiplied by the coefficient of F, in order to have E increased in value to correspond with the lesser amount of damage to C.

The computations of (1) and (3) are given in Table 1, which gives E when C is damaged to six different degrees less than F, and the economic loss on each $1,000 of economic value for these computations is given in Table 3.

The computations for (2) are given in Table 2, which gives E when C is damaged to nine different degrees more than F. The economic loss on $1,000 for each of these computations is given in Table 4.

Table 5 gives the fractional loss of the parts therein named as standards of measurement for them. When found convenient, these may be used for comparisons for the loss of functions in other parts of the body.

Table 6, the evom table (the word having been made from the first letter of each word of the phrase, economic value of man), is constructed on the dollar basis, so that the economic value of a person earning any fractional part of $1 a day, or $300 a year, or any number of times $1 a day, or $300 a year, may be readily computed. By these tables computations for obtaining the economic loss of a person from damages to his body from 0.01 to 0.80 are given, and are as accessible as those of any tables in which the values have been worked out for the purpose of shortening computations. There are therefore no more computations to be made than in obtaining the amount of a town or city tax of a person when we know the rate of taxation on $1,000 and the amount of property for which that person is assessed. Indeed, the process is similar, and for that reason may be readily understood. It will be seen that in Tables 1 and 2 the values of E are worked out for all practical economic conditions that may occur in F and C, and the economic loss on \$1,000 is given in Tables 3 and 4 for each computation.

For the purpose of illustrating how E is obtained when two different units of the body are injured, we will suppose that a person having two normal eyes meets with an accident which necessitates the removal of one of his eyes and his left hand at the wrist-joint. The loss in the functions of unit d is 0.16, and, therefore, 0.84 remains. The loss in the functions of unit a is 0.20, and, therefore, 0.80 remains. No other units of the body being injured, their value is normal and equal to one; therefore, we have $0.80 \text{ a } \; 0.84 \text{ d} = \text{F}$. Hence $\text{F} = 0.672$, and, introducing this value as the coefficient of F and C into the formula for the normal earning ability of the body, we have, $0.672 \text{ F } \; 0.672 \text{ C} = \text{E}$. We must now determine C in the vocation followed. It is evident that C is damaged to a greater degree than when the eye alone was lost. We then considered C damaged to the same degree as F. In the loss of an eye and the left hand we will determine that C is damaged to the first degree more than F, therefore we have (4) $0.672 \text{ F } \; 0.672^2 \text{ C} = \text{E}$. Hence $\text{E} = 0.3034$, and the economic loss is 0.6966 or \$696.60 on each \$1,000 of the economic value. Multiplying this by 6.11451, we have \$4,259.36 for the loss of an eye and the left hand of a person earning \$1 per day, or \$300 per year, when the economic value has been determined upon a 3½ per cent. discount basis. This gives the loss of the left hand in connection with the loss of an eye as \$2,459.25, on the basis of the person's economic value being \$6,114.51. If the right hand were lost with an eye, C would be damaged to a greater degree than when the left hand was lost. If it were determined that C was damaged to the second degree greater, then we would have, (5) $0.672 \text{ F } \; 0.672^3\text{C} = \text{E}$. Hence $\text{E} = 0.20389$, and the economic loss would be \$4,868.47. If it were determined that C was

damaged to the next degree greater, or the third degree, then we would have (6) $0.672 \text{ F } \; 0.672^4\text{C} = \text{E}$. Hence, $\text{E} = 0.137$, and the economic loss would be \$5,276.81 on the basis of the person's economic value being \$6,114.51. It will be seen by these illustrative cases that C can be varied to meet every possible condition that may occur to it from damages to F from injury or disease, and thereby E may be determined in accordance with every existing condition in F and C.

There may be a difference of opinions as to the standards of measurement for determining the loss to F in any given case of damage, yet, when these have been agreed upon, and the loss to F has been determined by them and a mathematical formula, the resulting value will always agree with the existing conditions of F in accordance with these standards. Therefore, it becomes a question of obtaining standards which will meet the economic conditions of F after being damaged from injury or disease. Although it is true that standards of measurement have not been determined and agreed upon for all parts of the systems and organs of the units of the body, nevertheless it is evident that if F has value the functions of each of the systems and organs of which it is composed must have its proportionate value. When each of these has been weighed, measured, compared, and tested in a scientific manner with regard to its economic value in a large number of cases, and an average value determined upon, this average value becomes a standard of measurement for that particular system or organ of the units of the body. It is in this way that all the scientific and economic standards of measurement now employed have been determined and agreed upon, and it is in this way that all the remaining ones will be established. Until the work of establishing these standards is completed we shall be obliged to employ such standards as have been agreed upon, and by the same methods by which these have been obtained determine new ones for all the remaining systems and organs of the units of the body which will eventually be accepted as standards of measurement. The question of standards of measurement for determining the functional ability of the body after damage from injury or disease is fundamental to the question for obtaining the remaining earning ability in such conditions. Without the former the latter cannot be obtained by the mathematical formula for the normal earning ability of the body. In determining whether the functions of the body are normal or abnormal in any given case, we must have a standard of measurement for the normal conditions of these functions, whether viewed separately or in conjunction with each other, as they exist in the body at the different periods of life. In other words, we must have the standard man for the different periods of life in order to determine how much a person is damaged in a given case.* The difference between what we find in this given case and the standard man for this period of life is a fraction of the functions of the part or parts examined, regarded as a whole, which when subtracted from it gives the remaining functions of the system or organs examined. For instance, if by an injury the sight of both eyes is reduced to 0.5, scientific standards of measurement, the fields of vision being only slightly affected, what is the loss to the person? The first question that arises is, how does this loss of half the sight of both eyes affect the functional ability of the body? The next question is, what is his competing ability in his vocation?

Therefore, in order to determine the loss in the earning ability of the person, we must find out how much the loss of one-half the vision of both eyes affects the functional ability of the eyes in the vocation followed. According to Magnus and Würdemann,† students of all professions, that is, skilled laborers, actually require three-fourths of normal vision, according to scientific standards of measurement, in order to perform the duties required of them. If this is the standard accepted, then a person who has sustained a loss of half the vision of both eyes would have sustained a loss of one-third of the vision actually needed to carry on the work of his profession, because 0.5 from 0.75 leaves 0.25, and 0.25 is one-third of 0.75; therefore, the person has lost one-third of the vision actually needed, and, if so, has two-thirds left. If no other system or organ is damaged this becomes the coefficient of F and C, and we have: $\frac{2}{3}$ F $\frac{2}{3}$ C = E. We must now consider how the loss affects the person in the particular vocation he follows, namely, in his competing ability. If it is determined that the loss of half the vision of both eyes damages a person's competing ability less than it does his functional ability, because there is no external appearance of the damage, and from this fact and all the circumstances in the case we determine that his competing ability is damaged only to the first degree less than his functional ability, we have for the formula, $\frac{2}{3}$ F $\frac{2}{3}^{\frac{1}{4}}$ C = E. Hence E = 0.5487, and the loss is 0.4573, which is $457.30 on each $1,000 of the economic value of the person. Multiplying $457.30 by 6.11451, we have $2,759.47 for the loss of half the vision of both eyes in a person earning $1 per day, or $300 per year. If he were earning $2 per day, then the economic loss would be two times $2,759.47, or $5,518.94. If he were earning $3 per day, then the economic loss would be three times $2,759.47, or $8,278.41, and so on. If the indemnity is too much for the person's earning ability, then the standard of measurement for determining the remaining functional ability is too high. If the person was an accountant, the standard of measurement would be reasonable and the result equitable. If the person was in a profession with less demands upon the eyes, and we determined that the competing ability was damaged to the least degree given in Table 1, column 9, then we would have $\frac{2}{3}$ F $\frac{2}{3}^{\frac{1}{10}}$C = E. Hence E = 0.6432, and the loss would be 0.3568, or $356.80 on each $1,000. Multiplying $356.80 by 6.11451, we have $2,169.65. This is $589.82 less than when C is considered damaged to the first degree less than F. There would be just this difference in each computation when C is considered damaged to the first degree less than F, and when it is considered damaged to the least degree less than F, as given in Table 1, for any number of times one dollar a day, or $300 per year. It will be seen, then, that it is a question of standards of measurement for the functional ability and of a determination of the competing ability for the vocation followed.

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*The dismembered parts of the standard man scattered throughout medical literature have been collected by Dr. C. R. Burr, of Portland, Maine, into a composite whole for each of the different periods of life, which he has designated, infancy, childhood, youth, manhood, change of life, old age, and second childhood.

†"Visual Economics."

Why not determine the earning ability directly from the loss in the functional ability, that is, estimate it from this loss according to the method universally in use to-day? Why is this method not just as good? In the first place, it would be guesswork, and that is not a scientific method. Why is such a method guesswork? To reiterate, for the purpose of making this point clear, let us refer to what has gone before in this paper.

In the analysis of a person to determine the elements which are indispensable to the earning ability, and which may be used as factors and multiplied to produce it so as to meet all the existing conditions relative to the earning ability, we found them to be three, namely, the functional, the technical, and the competing ability. We have shown conclusively that these elements must be used as factors to meet all the existing conditions of the earning ability. We will apply this analysis to one of the most common of physical forces, namely, a water power, to show why a mere estimation of the loss in the bodily functions will not give the loss to the earning ability, and why such loss to the earning ability cannot be determined from the functional loss alone. In applying this analysis to a water power we will let the volume of water in pounds going over a dam be the functional ability of the water power, because it is what nature gives to it, just as the body is what nature gives to man. The dam, the water-wheel, and its connections to the counter-shaft we will designate the technical ability of the water power, because it is what man gives to it in consequence of his own technical ability, just as the technical ability is given to man by man. The competing ability of a water power depends upon its location and its ability to perform work in competition with other powers, such as steam, gasoline, animal, and man power. It will be seen that in order for a water power to have an earning ability it must have all three of these elements. There can be no question about the need of the first two elements, namely, the volume of water in pounds going over a dam, and, second, the dam, water-wheel, and its connections to a counter-shaft in order to give power. To illustrate the importance of the third we might mention that in Labrador there are some magnificent water powers. These might be converted into power by building dams and installing water-wheels and counter-shafts, so as to furnish thousands of horse power, but these thousands of horse power would have no earning ability without a competing ability and what would be the competing ability of thousands of horse power up in Labrador? It is plainly evident, that at present, it would have no competing ability on account of its location, and therefore would have no earning ability.

From the comparison of the earning ability of man with that of a water power, it is evident that the earning ability cannot be determined from a consideration of his functional and technical ability alone or any estimation of them. We must have another element used as a factor, namely, the competing ability, in order to make the earning ability available in man and in a water power. The earning ability of man, or a water power, cannot be estimated from what nature gives to them alone, for without taking into consideration the technical and competing ability needed for both there would be no value in them for economic purposes, because they would have no earning ability. We have dwelt upon the fundamental part of this subject sufficiently to show that any estimation of the loss of the earning ability from the loss in the functions of the body alone is mere guesswork; that the loss in the earning ability from damages to the functional ability can be determined only by the use of an analysis which defines the indispensable elements of the person's earning ability, namely, the functional, the technical, and the competing ability, to be employed as factors in a mathematical formula, and that it must be solved in accordance with the principles upon which the formula is constructed in order to arrive at the value of an earning ability which will agree with all the existing conditions of the essential elements of that earning ability.

These principles are involved in the traffic in all commodities, in daily use by man, such as animals, hay and grain, vegetables, fuel, lights, and manufactured articles of all kinds.

In the earning ability of a horse we have an illustration of the application of these principles, just as in the case of man, for it depends upon the same elements which may be given the same name and may be represented by the same letters as symbols in a mathematical formula, and we then have $F\ T\ C = E$, for determining the value of a horse. In determining the functional ability of a horse we have to know all the elements that enter into such functional ability the same as in man, namely, age, height, weight, girth, and the functional conditions of the four units of the horse. The technical ability is quite as important, for a horse would have no earning ability if he was not trained as a driving or a work horse. Man gives him this in consequence of his own technical ability. The competing ability is also of quite as much importance, for the horse has had to compete with all kinds of powers and has steadily been displaced by them until he is narrowed down to a limited field of service. It is therefore plainly evident that we must take into consideration all three of the elements of a horse and use them as factors in order to determine his earning ability, which will agree with all the existing conditions of that earning ability.

If we analyze the traffic in commodities we see how these principles, here applied to man, are in daily use without the

person using them having the least consciousness of their employment. Take, for instance, the purchasing of a barrel of apples. Here we have three elements that determine their value and earning ability to the producer, namely, quantity, quality, and price. If we employ the first letter of each of these words as a symbol, and use it in a mathematical formula, we have $Q\ q\ p = V$. Now, supposing we had a full barrel of apples, first quality, and the price was $4 per barrel, the value would be $4. When these values are introduced into the formula we have $1Q\ 1q\ 4p = V$. Multiplying, we have $V = 4$. Now suppose at the next purchase there was only a half barrel of apples, same quality and price per full barrel. The storekeeper would tell you at once the cost would be $2. If we introduce these values into the formula we have $\frac{1}{2}Q\ 1q\ 4p = V$; multiplying, we have $V = 2$; hence the cost of a half barrel of apples is $2. At the next purchase let us suppose that it was late in the season and the storekeeper had only half a barrel of apples and the quality was only half as good as first quality. The storekeeper would say you can have that half barrel of apples for $1. He does not consciously determine the result on a mathematical formula. Let us see how it is worked out on the formula. We have, $\frac{1}{2}Q\ \frac{1}{2}q\ 4p = V$. Multiplying, we have $V = 1$. Hence the value of that half barrel of apples is $1 when the price of a full barrel of first quality is $4. The same methods would be true in regard to the other commodities named. Thus we see these principles are really used in every-day life in determining the value of any commodity, which is the earning ability to the producer. We have extended these illustrations in order to show that the principles here advocated for determining the earning ability of a man and his economic value are employed in obtaining the values of commodities in every-day life, that really the elements of their earning ability must be used as factors in a mathematical formula and multiplied in order to have that earning ability agree with all the existing conditions of those elements.

TABLE I

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Loss in F	Computation made when C is damaged to the same degree as F, and when C is damaged to six different degrees less than F.								
	F	C	E=	$C^{1.2}$ E=	$C^{1.3}$ E=	$C^{1.4}$ E=	$C^{1.5}$ E=	$C^{1.7}$ E=	$C^{1.10}$E=
0.01	.99	.99	=0.9801	0.985	0.9865	0.9875	0.988	0.9884	0.989
0.02	.98	.98	=0.9604	0.9702	0.9731	0.9751	0.976	0.9770	0.9780
0.03	.97	.97	=0.9409	0.9554	0.9593	0.9622	0.9641	0.9651	0.9670
0.04	.96	.96	=0.9216	0.9408	0.9465	0.9504	0.9523	0.9542	0.9561
0.05	.95	.95	=0.9025	0.9262	0.9388	0.9376	0.9405	0.9424	0.9452
0.06	.94	.94	=0.8836	0.9118	0.9202	0.9259	0.9277	0.9315	0.9343
0.07	.93	.93	=0.8649	0.8965	0.9067	0.9132	0.9151	0.9197	0.9234
0.08	.92	.92	=0.8464	0.8822	0.8942	0.9006	0.9043	0.9089	0.9126
0.09	.91	.91	=0.8281	0.8681	0.8898	0.8881	0.8927	0.8972	0.9001
0.10	.90	.90	=0.81	0.8541	0.8685	0.8766	0.8811	0.8865	0.8901
0.11	.89	.89	=0.7921	0.8392	0.8552	0.8641	0.8695	0.8748	0.8784
0.12	.88	.88	=0.7744	0.8254	0.8430	0.8527	0.8580	0.8641	0.8685
0.13	.87	.87	=0.7569	0.8108	0.8308	0.8404	0.8456	0.8526	0.8578
0.14	.86	.86	=0.7396	0.7972	0.8187	0.8290	0.8342	0.8419	0.8571
0.15	.85	.85	=0.7225	0.7828	0.8058	0.8160	0.8228	0.8304	0.8347
0.16	.84	.84	=0.7056	0.7694	0.7926	0.8047	0.8114	0.8190	0.8257
0.17	.83	.83	=0.6889	0.7561	0.7802	0.7885	0.7992	0.8075	0.8142
0.18	.82	.82	=0.6724	0.7429	0.7675	0.7806	0.7880	0.7970	0.8036
0.19	.81	.81	=0.6561	0.729	0.7549	0.7686	0.7759	0.7857	0.7929
0.20	.80	.80	=0.64	0.7152	0.7424	0.7568	0.7648	0.7752	0.7824
0.21	.79	.79	=0.6241	0.6915	0.7299	0.7449	0.7528	0.7639	0.7710
0.22	.78	.78	=0.6084	0.6887	0.7183	0.7332	0.7417	0.7527	0.7605
0.23	.77	.77	=0.5929	0.6752	0.7060	0.7214	0.7299	0.7415	0.7499
0.24	.76	.76	=0.5776	0.6627	0.6938	0.7098	0.7189	0.7303	0.7394
0.25	.75	.75	=0.5625	0.6495	0.6817	0.6982	0.7072	0.7192	0.7282
0.26	.74	.74	=0.5476	0.6371	0.6697	0.6867	0.6963	0.7089	0.7178
0.27	.73	.73	=0.5329	0.6241	0.6577	0.6752	0.6847	0.6978	0.7073
0.28	.72	.72	=0.5184	0.6112	0.6458	0.6638	0.6739	0.6868	0.6969
0.29	.71	.71	=0.5041	0.5985	0.6340	0.6517	0.6624	0.6759	0.6858
0.30	.70	.70	=0.49	0.5859	0.6223	0.6405	0.6517	0.6650	0.6755
0.31	.69	.69	=0.4761	0.5738	0.6099	0.6285	0.6403	0.6541	0.6679
0.32	.68	.68	=0.4624	0.561	0.5984	0.6174	0.6296	0.6432	0.6541
0.33	.67	.67	=0.4489	0.5487	0.5862	0.6056	0.6184	0.6324	0.6432
0.34	.66	.66	=0.4356	0.5365	0.5748	0.5946	0.6078	0.6217	0.6329
0.35	.65	.65	=0.4225	0.5239	0.5629	0.5830	0.5967	0.6110	0.6220
0.36	.64	.64	=0.4096	0.512	0.5516	0.5721	0.5856	0.6003	0.6118
0.37	.63	.63	=0.3969	0.4995	0.5399	0.5607	0.5745	0.5896	0.6010
0.38	.62	.62	=0.3844	0.4879	0.5288	0.5499	0.5635	0.5790	0.5908
0.39	.61	.61	=0.3721	0.4758	0.5172	0.5386	0.5526	0.5685	0.5801
0.40	.60	.60	=0.36	0.4644	0.5058	0.5280	0.5418	0.5580	0.5700
0.41	.59	.59	=0.3481	0.4525	0.4944	0.5174	0.531	0.5475	0.5593
0.42	.58	.58	=0.3364	0.4413	0.4837	0.5075	0.5202	0.5370	0.5492
0.43	.57	.57	=0.3249	0.4297	0.4725	0.4959	0.5090	0.5261	0.5386
0.44	.56	.56	=0.3136	0.4188	0.4614	0.4884	0.4984	0.5157	0.5286
0.45	.55	.55	=0.3025	0.4075	0.4504	0.4735	0.4878	0.5049	0.5181
0.46	.54	.54	=0.2916	0.3969	0.4395	0.4627	0.4773	0.4946	0.5076
0.47	.53	.53	=0.2809	0.3858	0.4287	0.4520	0.4664	0.4838	0.4971
0.48	.52	.52	=0.2704	0.3749	0.4180	0.4414	0.4560	0.4737	0.4872
0.49	.51	.51	=0.2601	0.3641	0.4080	0.4309	0.4447	0.4630	0.4763
0.50	.50	.50	=0.25	0.3535	0.3985	0.4205	0.4350	0.4530	0.4665
0.51	.49	.49	=0.2401	0.3430	0.3871	0.4096	0.4243	0.4424	0.4561

TABLE I—Continued

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Loss in F	Computation made when C is damaged to the same degree as F, and when C is damaged to six different degrees less than F.								
	F	C	E=	$C^{1.2}$ E=	$C^{1.3}$ E=	$C^{1.4}$ E=	$C^{1.5}$ E=	$C^{1.7}$ E=	$C^{1.10}$E=
0.52	.48	.48	=0.2304	0.3326	0.3758	0.3993	0.4142	0.4324	0.4459
0.53	.47	.47	=0.2209	0.3219	0.3651	0.3886	0.4037	0.4220	0.4356
0.54	.46	.46	=0.2116	0.3118	0.3551	0.3785	0.3937	0.4117	0.4255
0.55	.45	.45	=0.2025	0.3015	0.3447	0.3681	0.3834	0.4014	0.4153
0.56	.44	.44	=0.1936	0.2917	0.3348	0.3581	0.3735	0.3911	0.4052
0.57	.43	.43	=0.1849	0.2795	0.3225	0.3478	0.3633	0.3809	0.3951
0.58	.42	.42	=0.1764	0.2721	0.3145	0.3381	0.3532	0.3708	0.3851
0.59	.41	.41	=0.1681	0.2624	0.3046	0.3321	0.3431	0.3595	0.3747
0.60	.40	.40	=0.16	0.2528	0.2948	0.3180	0.3332	0.3504	0.3648
0.61	.39	.39	=0.1521	0.2433	0.2847	0.3081	0.3229	0.3408	0.3549
0.62	.38	.38	=0.1444	0.2340	0.2751	0.2983	0.3131	0.3309	0.3450
0.63	.37	.37	=0.1369	0.2249	0.2652	0.2886	0.3030	0.3207	0.3348
0.64	.36	.36	=0.1296	0.216	0.2559	0.2791	0.2934	0.3110	0.3250
0.65	.35	.35	=0.1225	0.2068	0.2481	0.2709	0.2835	0.3010	0.3150
0.66	.34	.34	=0.1156	0.1982	0.2373	0.2597	0.2740	0.2913	0.3053
0.67	.33	.33	=0.1089	0.1894	0.2280	0.2501	0.2643	0.2814	0.2953
0.68	.32	.32	=0.1024	0.1811	0.2188	0.2406	0.2547	0.2720	0.2854
0.69	.31	.31	=0.0961	0.1726	0.2095	0.2312	0.2452	0.2622	0.2755
0.70	.30	.30	=0.09	0.1644	0.2007	0.222	0.2358	0.2526	0.2658
0.71	.29	.29	=0.0841	0.1560	0.1902	0.2125	0.2262	0.2430	0.2560
0.72	.28	.28	=0.0784	0.1481	0.1831	0.2035	0.2170	0.2335	0.2464
0.73	.27	.27	=0.0729	0.1401	0.1744	0.1944	0.2076	0.2238	0.2367
0.74	.26	.26	=0.0676	0.1326	0.1658	0.1856	0.1986	0.2145	0.2272
0.75	.25	.25	=0.0625	0.1250	0.1572	0.1767	0.1895	0.2050	0.2175
0.76	.24	.24	=0.0576	0.1176	0.1490	0.1680	0.1804	0.1958	0.2080
0.77	.23	.23	=0.0529	0.1101	0.1407	0.1591	0.1713	0.1865	0.1984
0.78	.22	.22	=0.0484	0.1031	0.1328	0.1507	0.1625	0.1773	0.1889
0.79	.21	.21	=0.0441	0.0961	0.1247	0.1421	0.1537	0.168	0.1795
0.80	.20	.20	=0.04	0.0894	0.1170	0.1338	0.1450	0.1588	0.1702

TABLE 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Loss in F	Computations made when C is damaged from 2 to 10 degrees more than F.								
	C^2 E=	C^3 E=	C^4 E=	C^5 E=	C^6E=	C^7 E=	C^8 E=	C^9 E=	C^{10} E=
0.01	0.9702	0.9604	0.9507	0.9411	0.9316	0.9222	09129	0.9039	0.8948
0.02	0.9415	0.9222	0.9037	0.8856	0.8678	0.8504	0.8333	0.8166	0.8002
0.03	0.9126	0.8852	0.8586	0.8328	0.8078	0.7835	0.7599	0.7371	0.7149
0.04	0.8847	0.8493	0.8153	0.7826	0.7512	0.7211	0.6922	0.6645	0.6379
0.05	0.8573	0.8144	0.7736	0.7349	0.6981	0.6631	0.6299	0.5984	0.5684
0.06	0.8305	0.7806	0.7337	0.6896	0.6482	0.6093	0.5727	0.5383	0.5060
0.07	0.8043	0.7479	0.6955	0.6468	0.6015	0.5593	0.5251	0.4883	0.4541
0.08	0.7786	0.7163	0.6589	0.6061	0.5515	0.5073	0.4667	0.4293	0.3949
0.09	0.7535	0.6856	0.6238	0.5676	0.5165	0.4700	0.4277	0.3692	0.3359
0.10	0.729	0.6561	0.5904	0.5313	0.4781	0.4302	0.3871	0.3483	0.3133
0.11	0.7049	0.6273	0.5582	0.4967	0.4420	0.3933	0.3500	0.3115	0.2772
0.12	0.6814	0.5996	0.5276	0.4642	0.4084	0.3593	0.3161	0.2781	0.2447
0.13	0.6583	0.5727	0.4982	0.4334	0.3770	0.3279	0.2852	0.2481	0.2158
0.14	0.6360	0.5469	0.4703	0.4044	0.3477	0.293	0.2519	0.2166	0.1862
0.15	0.6141	0.5219	0.4436	0.377	0.3204	0.2723	0.2314	0.1966	0.1671
0.16	0.5927	0.4978	0.4181	0.3512	0.295	0.2478	0.2081	0.1748	0.1467
0.17	0.5717	0.4745	0.3938	0.3268	0.2712	0.225	0.1887	0.1566	0.1299
0.18	0.5513	0.4520	0.3706	0.3038	0.2491	0.2042	0.1674	0.1372	0.1125
0.19	0.5314	0.4304	0.3486	0.2823	0.2286	0.1851	0.1499	0.1214	0.0983
0.20	0.512	0.4096	0.3276	0.2620	0.2096	0.1676	0.134	0.1072	0.0859
0.21	0.4930	0.3894	0.3076	0.2430	0.1919	0.1516	0.1197	0.0945	0.0746
0.22	0.4745	0.3701	0.2886	0.2251	0.1755	0.1368	0.1067	0.0832	0.0648
0.23	0.4565	0.3515	0.2706	0.2083	0.1603	0.1234	0.095	0.0731	0.0562
0.24	0.4389	0.3335	0.2534	0.1925	0.1463	0.1111	0.0844	0.0641	0.0487
0.25	0.4218	0.3163	0.2372	0.1779	0.1334	0.1000	0.075	0.0562	0.0421
0.26	0.4052	0.2998	0.2218	0.1641	0.1214	0.0898	0.0664	0.0491	0.0363
0.27	0.3890	0.2839	0.2072	0.1512	0.1103	0.0805	0.0587	0.0428	0.0312
0.28	0.3732	0.2687	0.1934	0.1392	0.1002	0.0721	0.0519	0.0373	0.0268
0.29	0.3579	0.2541	0.1804	0.1280	0.0908	0.0644	0.0457	0.0324	0.023
0.30	0.343	0.2401	0.168	0.1176	0.0823	0.0576	0.0403	0.0282	0.0197
0.31	0.3285	0.2266	0.1563	0.1078	0.0743	0.0512	0.0353	0.0243	0.0167
0.32	0.3144	0.2137	0.1453	0.0988	0.0671	0.0456	0.031	0.0210	0.0142
0.33	0.3007	0.2014	0.1349	0.0903	0.0605	0.0405	0.0271	0.0181	0.0121
0.34	0.2874	0.1896	0.1251	0.0825	0.0544	0.0359	0.0236	0.0155	0.0102
0.35	0.2746	0.1784	0.1159	0.0753	0.0489	0.0317	0.0206	0.0133	0.0086
0.36	0.2621	0.1679	0.1073	0.0686	0.0439	0.028	0.0179	0.0114	0.0072
0.37	0.2500	0.1575	0.0992	0.0624	0.0393	0.0247	0.0155	0.0097	0.0061
0.38	0.2383	0.1477	0.0915	0.0567	0.0351	0.0217	0.0134	0.0083	0.0051
0.39	0.2269	0.1384	0.0844	0.0514	0.0313	0.019	0.0115	0.007	0.0042
0.40	0.216	0.1296	0.0777	0.0466	0.0279	0.0167	0.01	0.006	0.0036
0.41	0.2053	0.1211	0.0714	0.0421	0.0248	0.0146	0.0086	0.005	0.0029
0.42	0.1951	0.1131	0.0655	0.0379	0.0219	0.0127	0.0073	0.0042	0.0024
0.43	0.1851	0.1055	0.0601	0.0342	0.0194	0.011	0.0062	0.0035	0.0019
0.44	0.1756	0.0983	0.055	0.0308	0.0172	0.0096	0.0053	0.0029	0.0016
0.45	0.1663	0.0914	0.0502	0.0275	0.0151	0.0083	0.0045	0.0026	0.0014
0.46	0.1574	0.0849	0.0458	0.0247	0.0133	0.0071	0.0038	0.002	0.001
0.47	0.1488	0.0788	0.0417	0.0221	0.0117	0.0062	0.0032	0.0016	0.0008
0.48	0.1406	0.0731	0.038	0.0197	0.0102	0.0053	0.0027	0.0014	0.0007
0.49	0.1326	0.0676	0.0344	0.0175	0.0089	0.0045	0.0022	0.0011	0.0005
0.50	0.1250	0.0625	0.0312	0.0156	0.0078	0.0039	0.0019	0.0009	0.0004
0.51	0.1176	0.0576	0.0282	0.0138	0.0067	0.0032	0.0015	0.0007	0.0003
0.52	0.1105	0.0530	0.0254	0.0121	0.0058	0.0027	0.0012	0.0005	0.0002
0.53	0.1038	0.0487	0.0228	0.0107	0.0050	0.0023	0.0010	0.0004	0.0001

TABLE 2—Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Loss in F	Computations made when C is damaged from 2 to 10 degrees more than F.								
	C^2 E=	C^3 E=	C^4 E=	C^5 E=	C^6E=	C^7 E=	C^8 E=	C^9 E=	C^{10} E=
0.54	0.0973	0.0447	0.0205	0.0094	0.0043	0.0019	0.0008	0.0003	0.0001
0.55	0.0911	0.0409	0.0184	0.0082	0.0036	0.0016	0.0007	0.0003	0.0001
0.56	0.0851	0.0374	0.0164	0.0072	0.0031	0.0013	0.0005	0.0002	0.0000
0.57	0.0795	0.0341	0.0146	0.0062	0.0026	0.0011	0.0004	0.0001	
0.58	0.0740	0.0310	0.013	0.0054	0.0022	0.0009	0.0003	0.0001	
0.59	0.0689	0.0282	0.0115	0.0047	0.0019	0.0007	0.0002	0.0000	
0.60	0.064	0.0256	0.0102	0.004	0.0016	0.0006	0.0002		
0.61	0.0593	0.0231	0.009	0.0035	0.0013	0.0005	0.0001		
0.62	0.0548	0.0208	0.0079	0.0030	0.0011	0.0004	0.0001		
0.63	0.0506	0.0187	0.0069	0.0025	0.0009	0.0003	0.0001		
0.64	0.0466	0.0167	0.006	0.0021	0.0007	0.0002	0.0000		
0.65	0.0428	0.0149	0.0052	0.0018	0.0006	0.0001			
0.66	0.0393	0.0133	0.0045	0.0015	0.0005	0.0001			
0.67	0.0359	0.0118	0.0038	0.0012	0.0003	0.0000			
0.68	0.0327	0.0104	0.0033	0.0010	0.0003				
0.69	0.0297	0.0092	0.0028	0.0008	0.0002				
0.70	0.027	0.0081	0.0024	0.0007	0.0002				
0.71	0.0243	0.007	0.002	0.0005	0.0001				
0.72	0.0219	0.0061	0.0017	0.0004	0.0001				
0.73	0.0196	0.0052	0.0014	0.0003	0.0000				
0.74	0.0175	0.0045	0.0011	0.0002					
0.75	0.0156	0.0039	0.0009	0.0002					
0.76	0.0138	0.0032	0.0007	0.0001					
0.77	0.0121	0.0027	0.0005	0.0001					
0.78	0.0106	0.0023	0.0005	0.0001					
0.79	0.0092	0.0019	0.0003	0.0000					
0.80	0.008	0.0016	0.0003						

TABLE 3

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Loss in F	Loss on $1,000, when C is damaged to the same degree as F, and when C is damaged to six different degrees less than F.						
	C^{1}	C^{1-2}	C^{1-3}	C^{1-4}	C^{1-5}	C^{1-7}	C^{1-10}
0.01	$ 19.90	$ 15.00	$ 13.50	$ 12.50	$ 12.00	$ 11.60	$ 11.00
0.02	39.60	29.80	26.90	24.90	24.00	23.00	22.00
0.03	59.10	44.60	40.70	37.80	35.90	34.90	33.00
0.04	70.40	59.20	53.50	49.60	47.70	45.80	43.90
0.05	97.50	73.80	66.20	62.40	59.50	57.60	54.80
0.06	116.40	88.20	79.80	74.10	72.30	68.50	65.70
0.07	135.10	103.50	93.30	86.80	84.90	80.30	76.60
0.08	153.60	117.80	105.80	99.40	95.70	91.10	87.40
0.09	171.90	131.90	110.20	111.90	107.30	102.80	99.90
0.10	190.00	145.90	131.50	123.40	118.90	113.50	109.90
0.11	207.90	160.80	144.80	135.90	130.50	125.50	121.60
0.12	225.60	174.60	157.00	147.30	142.00	135.90	131.50
0.13	243.10	189.20	169.20	159.60	154.40	147.40	142.20
0.14	260.40	202.80	181.30	171.00	165.80	158.10	152.90
0.15	277.50	217.20	194.20	184.00	177.20	169.60	165.30
0.16	294.40	230.60	207.40	195.30	188.60	181.00	174.30
0.17	311.10	243.90	219.80	211.50	200.80	192.50	185.80
0.18	327.60	257.10	232.50	219.40	212.00	203.00	196.40
0.19	343.90	271.00	245.10	231.40	224.10	214.30	207.10
0.20	360.00	284.80	257.60	243.20	235.20	224.80	217.60
0.21	375.90	308.50	270.10	255.10	247.20	236.10	229.00
0.22	391.60	311.30	281.70	266.80	258.30	247.30	239.50
0.23	407.10	324.80	294.00	278.60	270.10	258.50	250.10
0.24	422.40	347.30	306.20	290.20	281.10	269.70	260.60
0.25	437.50	350.50	318.30	301.80	292.80	280.80	271.80
0.26	452.40	362.90	330.30	312.30	303.70	291.10	282.20
0.27	467.10	375.90	342.30	324.80	315.30	302.20	292.70
0.28	481.60	388.80	354.20	336.20	326.10	313.20	303.10
0.29	495.90	401.50	366.00	348.30	337.60	324.10	313.50
0.30	510.00	414.10	377.70	359.50	348.30	335.00	324.50
0.31	523.90	426.70	390.10	371.50	359.70	345.90	334.90
0.32	537.60	439.00	401.60	382.60	370.40	356.80	345.90
0.33	551.10	451.30	413.80	394.40	381.60	367.60	356.80
0.34	564.40	463.50	425.20	405.40	392.20	378.30	367.10
0.35	577.50	476.10	437.10	417.00	403.30	389.00	378.00
0.36	590.40	488.00	448.40	427.90	414.40	397.70	388.20
0.37	603.10	500.50	460.10	439.30	425.50	410.40	399.00
0.38	615.60	512.10	471.20	450.10	436.50	421.00	409.20
0.39	627.90	524.20	482.80	461.40	447.40	431.50	419.90
0.40	640.00	535.60	494.20	472.00	458.20	442.00	430.00
0.41	651.90	547.50	505.60	482.60	469.00	452.50	440.70
0.42	663.60	558.70	516.30	492.50	478.80	463.00	450.80
0.43	675.10	570.30	527.50	504.10	491.00	473.90	461.40
0.44	686.40	581.20	538.60	511.60	501.60	484.30	471.40
0.45	697.50	592.50	549.60	526.50	512.20	495.10	481.90
0.46	708.40	603.10	560.50	537.30	522.70	505.40	492.40
0.47	719.10	614.20	571.30	548.00	533.60	516.20	502.90
0.48	729.60	625.10	582.00	558.00	544.00	526.30	512.80
0.49	739.90	635.90	592.00	569.10	555.30	537.00	523.20
0.50	750.00	646.50	601.50	579.50	565.00	547.00	533.50
0.51	759.60	657.00	612.90	590.40	575.70	557.60	543.90

TABLE 3—Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Loss in F	Loss on $1,000, when C is damaged to the same degree as F, and when C is damaged to six different degrees less than F.						
	C^{1}	C^{1-2}	C^{1-3}	C^{1-4}	C^{1-5}	C^{1-7}	C^{1-10}
0.52	769.60	667.40	624.20	600.70	585.80	567.60	554.10
0.53	779.10	678.10	634.90	611.40	596.30	578.00	564.40
0.54	788.40	688.20	644.90	621.50	606.40	588.30	574.50
0.55	795.50	698.50	655.30	631.90	616.60	598.60	584.70
0.56	806.40	708.30	665.20	641.90	626.50	608.90	594.80
0.57	815.10	720.50	677.50	652.20	637.70	619.10	604.90
0.58	823.50	727.90	685.50	661.90	646.80	629.20	614.90
0.59	831.90	737.60	695.40	667.90	656.90	640.90	625.30
0.60	840.00	747.20	705.20	682.00	666.80	649.20	635.20
0.61	847.10	756.70	715.30	691.90	677.10	659.20	645.10
0.62	855.60	766.00	724.90	701.70	686.90	669.10	655.00
0.63	863.10	775.10	734.80	711.40	697.00	679.30	665.20
0.64	870.40	784.00	744.10	720.90	706.60	689.00	675.00
0.65	877.50	793.20	751.90	729.10	716.50	699.00	685.00
0.66	884.40	801.80	762.70	740.30	726.00	708.70	694.70
0.67	891.10	810.60	772.00	749.90	735.70	718.60	704.70
0.68	897.60	818.90	781.20	759.40	745.30	728.00	714.60
0.69	903.90	827.40	790.50	768.80	754.80	737.80	724.50
0.70	910.00	835.60	799.30	778.00	764.20	747.40	734.20
0.71	915.90	844.00	809.80	787.50	773.80	757.00	744.00
0.72	962.60	851.90	816.90	796.50	783.00	766.50	753.60
0.73	927.10	858.90	825.60	805.60	792.40	776.20	763.30
0.74	932.40	867.40	834.20	814.40	801.40	785.50	772.80
0.75	937.50	875.00	842.80	823.30	810.50	795.00	782,50
0.76	942.40	882.40	851.00	832.00	819.60	804.20	792.00
0.77	947.10	889.90	859.30	840.90	828.70	813.50	801.60
0.78	951.50	896.90	867.20	849.30	837.50	822.70	811.10
0.79	955.10	903.90	875.30	857.90	846.30	832.00	820.50
0.80	960.00	910.60	883.00	866.20	855.00	841.20	829.80

TABLE 4

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Loss in F	Loss on $1.000 when C is damaged from 2 to 10 degrees more than F								
	C^2	C^3	C^4	C^5	C^6	C^7	C^8	C^9	C^{10}
0.01	$ 29.80	$ 39.60	$ 49.30	$ 58.90	$ 68.40	$ 77.80	$ 87.10	$ 96.10	$105.20
0.02	58.50	97.80	96.30	114.40	132.20	149.60	166.70	183.40	199.80
0.03	87.40	114.80	141.40	167.20	192.20	216.50	240.10	262.90	285.10
0.04	115.30	150.70	184.70	217.40	248.80	278.90	307.80	335.50	362.10
0.05	142.70	185.60	226.40	265.10	301.90	336.90	370.10	401.60	431.60
0.06	169.50	219.40	266.30	310.40	351.80	390.70	427.30	461.70	494.00
0.07	195.70	252.10	304.50	353.20	398.50	440.70	474.90	511.70	545.90
0.08	221.40	283.70	341.10	393.90	448.50	492.70	533.30	570.70	605.10
0.09	246.50	314.40	376.20	432.40	483.50	530.00	572.30	630.80	664.10
0.10	271.00	343.90	409.60	468.70	521.90	569.80	612.90	651.70	686.70
0.11	295.10	372.70	441.80	503.80	558.00	606.70	650.00	688.50	722.80
0.12	318.60	400.40	472.40	535.80	591.60	640.70	683.90	721.90	755.30
0.13	341.70	427.30	501.80	566.60	623.00	672.10	714.80	751.90	784.20
0.14	364.00	453.10	529.70	595.60	652.30	707.00	748.10	783.40	813.80
0.15	385.90	478.10	556.40	623.00	679.60	727.70	768.60	803.40	832.90
0.16	407.30	502.20	581.90	648.80	705.00	752.20	791.90	825.20	853.30
0.17	428.30	525.50	606.20	673.20	728.80	775.00	811.30	843.40	870.10
0.18	448.70	548.00	629.40	696.20	750.90	795.80	832.60	862.80	887.50
0.19	468.60	569.60	651.40	717.70	771.40	814.90	850.10	878.60	901.70
0.20	488.00	590.40	672.40	738.00	790.40	832.40	866.00	892.80	914.10
0.21	507.00	610.60	692.40	757.00	808.10	848.40	880.30	905.50	925.40
0.22	525.50	629.90	711.40	774.90	824.50	863.20	893.30	916.80	935.20
0.23	543.50	648.50	729.40	791.70	839.70	876.60	905.00	926.90	943.80
0.24	561.10	666.50	746.60	807.50	853.70	888.90	915.60	935.90	951.30
0.25	578.20	683.70	762.80	822.10	866.60	900.00	925.00	943.80	959.90
0.26	594.80	700.20	778.20	835.90	878.60	910.20	933.60	950.90	963.70
0.27	611.00	716.10	792.80	848.80	889.70	919.50	941.30	957.20	968.80
0.28	626.80	731.30	806.60	860.80	899.80	927.90	948.10	962.70	973.20
0.29	642.10	745.90	819.60	872.00	909.20	935.60	954.30	967.60	977.00
0.30	657.00	759.90	832.00	882.40	917.70	942.40	959.70	971.80	980.30
0.31	671.50	773.40	843.70	892.20	925.70	948.80	964.70	975.70	983.30
0.32	685.60	786.30	854.70	901.20	932.90	954.40	969.00	979.00	985.80
0.33	699.30	798.60	865.10	907.70	939.50	959.50	972.90	981.90	987.90
0.34	712.60	810.40	874.90	917.50	945.60	964.10	976.40	984.50	989.80
0.35	725.40	821.60	884.10	924.70	951.10	968.30	979.40	986.70	991.40
0.36	737.90	832.10	892.70	931.40	956.10	972.00	982.10	988.60	992.80
0.37	750.00	842.50	900.80	937.60	960.70	975.30	984.50	990.30	993.90
0.38	761.70	852.30	908.50	943.30	964.90	978.30	986.60	991.70	994.90
0.39	773.10	861.60	915.60	948.60	968.70	981.00	988.50	993.00	995.80
0.40	784.00	870.40	922.30	953.40	972.10	983.30	990.00	994.00	996.40
0.41	794.70	878.90	928.60	957.90	975.20	985.40	991.40	995.00	997.10
0.42	804.90	886.90	934.50	962.10	978.10	987.30	992.70	995.80	997.60
0.43	814.90	894.50	939.90	965.80	980.60	989.00	993.80	996.50	998.10
0.44	824.40	901.70	945.00	969.20	982.80	990.40	994.70	997.10	998.40
0.45	833.70	908.60	949.80	972.50	984.90	991.70	995.50	997.40	998.60
0.46	824.60	915.10	954.20	975.30	986.70	992.90	996.20	998.00	999.00
0.47	851.20	921.20	958.30	979.90	988.30	993.80	996.80	998.40	999.20
0.48	859.40	926.90	962.00	980.30	989.80	994.70	997.30	998.60	999.30
0.49	867.40	932.40	965.60	982.50	991.10	995.50	997.80	998.90	999.50
0.50	875.00	937.50	968.80	984.40	992.20	996.10	998.10	999.10	999.60
0.51	882.40	942.40	971.80	986.20	993.30	996.80	998.50	999.30	999.70
0.52	889.50	947.00	974.60	987.90	994.20	997.30	998.80	999.50	999.80
0.53	896.20	951.30	977.20	989.30	995.00	997.70	999.00	999.60	999.90

TABLE 4—Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Loss in F	Loss on $1.000 when C is damaged from 2 to 10 degrees more than F								
	C^2	C^3	C^4	C^5	C^6	C^7	C^8	C^9	C^{10}
0.54	902.70	955.30	979.50	990.60	995.70	998.10	999.20	999.70	999.90
0.55	908.90	959.10	981.60	991.80	996.40	998.40	999.30	999.70	999.90
0.56	914.90	962.60	983.60	992.80	996.90	998.70	999.50	999.80	1000.00
0.57	920.50	965.90	985.40	993.80	997.40	998.90	999.60	999.90	
0.58	926.00	969.00	987.00	994.60	997.80	999.10	999.70	999.90	
0.59	931.10	971.80	988.50	995.30	998.10	999.30	999.80	1000.00	
0.60	936.00	974.40	989.80	996.00	998.40	999.40	999.80		
0.61	940.70	976.90	991.00	996.50	998.70	999.50	999.90		
0.62	945.20	979.20	992.10	997.00	998.90	999.60	999.90		
0.63	949.40	981.30	993.10	997.50	999.10	999.70	999.90		
0.64	953.40	983.30	994.00	997.90	999.30	999.80	1000.00		
0.65	957.20	985.10	994.80	998.20	999.40	999.90			
0.66	960.70	986.70	995.50	998.50	999.50	999.90			
0.67	964.10	988.20	996.20	998.80	999.70	1000.00			
0.68	967.30	989.60	996.70	999.00	999.70				
0.69	970.30	990.80	997.20	999.20	999.80				
0.70	973.00	991.90	997.60	999.30	999.80				
0.71	975.70	993.00	998.00	999.50	999.90				
0.72	978.10	993.90	998.30	999.60	1000.00				
0.73	980.40	994.80	998.60	999.70					
0.74	982.50	995.50	998.90	999.80					
0.75	984.40	996.10	999.10	999.80					
0.76	986.20	996.70	999.30	999.90					
0.77	987.90	997.30	999.50	1000.00					
0.78	989.40	997.70	999.50						
0.79	990.80	998.10	999.70						
0.80	992.00	998.40	999.70						

TABLE 5

Standard of Measurement for determining Damages to F (a) of the body.

Loss in F (a) in anchylosis of				Loss in F (a) in amputation of			
Fingers,		Toes,		Fingers,		Toes,	
Little,	0.01	Little,	0.005	Little,	0.01	Little,	0.005
Ring,	0.02	Fourth,	0.005	Ring,	0.02	Fourth,	0.005
Middle,	0.02	Middle,	0.005	Middle,	0.03	Middle,	0.01
Index,	0.02	Second,	0.005	Index,	0.04	Second,	0.01
Thumb,	0.03	Big,	0.01	Thumb,	0.05	Big	0.02
Wrist,	0.10	Ankle,	0.10	Hand,	0.20	Foot,	0.20
Elbow,	0.15	Knee,	0.15	Fore Arm,	0.25	Leg,	0.25
Shoulder,	0.15	Hip,	0.15	Arm,	0.30	Thigh,	0.30

No. 6—EVOM TABLE

Based on the premises that F T C=E and that the gross economic value of man is the present value of all his earnings for a prospective working life, and that the net economic value of a man is the present value of all his earnings less the present value of all his personal expenses for his prospective life.

The money values here given may be used either for the gross, or the net, economic value of man, depending upon whether $1 per day is the gross, or the net, income per day for three hundred days of the year, namely $300 per year, for a prospective working life.

This table is computed on a 3½ per cent. discount basis.

At the age of	Money value	Annual increase	Percentage of increase in 5 yrs.	No. living at	No. deaths in 5 yrs.	Per. of death in 5 yrs.
Birth	133.29			513		
5	1388.44	251.03	911.31	372	141	27.48
10	2900.98	302.50	108.94	355	17	4.57
15	4754.26	370.65	63.88	346	9	2.53
20	5797.72	208.69	24.05	335	11	3.17
25	6114.51	63.35	5.46	321	14	4.17
	Decrease	Decrease	Decrease			
30	5985.71	25.76	2.10	307	14	4.36
35	5664.43	64.25	5.36	291	16	5.21
40	5262.30	80.43	7.13	275	16	5.49
45	4784.29	95.62	9.08	257	18	6.54
50	4178.96	121.04	10.57	237	20	7.78
55	3420.67	151.68	18.14	215	22	9.28
60	2413.00	201.52	29.45	189	26	12.09
65	1141.72	254.25	52.68	156	33	17.46
70	19.10	224.73	98.33	118	38	24.35
75	—609.32	125,68	3293.50	79	39	33.05
80	—1017.88	81.71	67.05	44	35	44.30

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END OF
TITLE